DOI: 10.21088/per.2320.0022.14126.4

Pediatric Education and Research
Volume 14 Number 1 January - June 2026

ORIGINAL ARTICLE

Pericardial Effusion Following Respiratory Tract Infection in Children

Chakradhar Maddela

HOW TO CITE THIS ARTICLE:

Chakradhar Maddela. Pericardial Effusion Following Respiratory Tract Infection in Children. Pediatr. Edu. Res. 2026;14(1): 21-25.

ABSTRACT

Pericardial effusion is an uncommon but clinically important complication of upper / lower respiratory tract infections (URTIs) in children. Although most URTIs are benign and self-limiting, certain viral pathogens can extend beyond the respiratory tract and cause pericardial inflammation, leading to fluid accumulation. Early recognition is essential to prevent life-threatening complications such as cardiac tamponade. This review summarizes current knowledge on epidemiology, etiological agents, pathophysiology, clinical manifestations, diagnostic evaluation, and management strategies for pericardial effusion following URTIs in pediatric populations.

KEYWORDS

• Pericardial Effusion • Upper Respiratory Tract Infection (Urti) • Children • Viral Pericarditis • Pediatric Cardiology • Cardiac Tamponade

INTRODUCTION

Upper respiratory tract infections are among the most common illnesses in childhood, accounting for a significant proportion of pediatric outpatient visits. While URTIs are typically mild (unlike lower respiratory tract infections), they can occasionally lead to systemic complications, including pericardial involvement. Pericardial effusion the accumulation of fluid within the pericardial sac, may arise secondary to viral pericarditis triggered by common respiratory pathogens. Because symptoms may be subtle, clinicians must maintain a high index of suspicion to ensure timely diagnosis and management.

EPIDEMIOLOGY[1]

Pericardial effusion in children is relatively rare, with viral infections being the most common cause. The incidence increases during

AUTHOR'S AFFILIATION:

Professor of Pediatrics, Division of NICU–PICU, Department of Pediatrics, MNR Medical College & Hospital, Sangareddy, Telangana, India.

CORRESPONDING AUTHOR:

Chakradhar Maddela, Professor, Division of NICU–PICU, Department of Pediatrics, MNR Medical College & Hospital, Sangareddy, Telangana, India.

E-mail: drchakradharmetpally@gmail.com

➢ **Received:** 31-12-2025 ➢ **Accepted:** 02-02-2026

seasonal peaks of respiratory viruses such as influenza and Respiratory syncytial virus (RSV). Most cases occur in previously healthy children, though immunocompromised patients may be at higher risk for severe disease.

AETIOLOGY[1]

1. **Viral Causes (Most Common):** Coxsackievirus B, Echovirus, Adenovirus, Influenza A and B, Parainfluenza virus, Respiratory syncytial virus (RSV), SARS-CoV-2 (rare pediatric cases reported).
2. **Bacterial Causes (Less Common):** Streptococcus pneumoniae, Staphylococcus aureus, Haemophilus influenzae.
3. **Immune-Mediated Mechanisms:** Some children develop pericardial inflammation due to post-infectious immune dysregulation rather than direct viral invasion.

Table 1: Aetiology (post-URTI)

Category	Causes
Viral	Coxsackie, Echovirus, Adenovirus, Influenza, SARS-CoV-2
Post-infectious	Immune-mediated pericarditis
Bacterial	Staphylococcal, Streptococcus (rare)
Tuberculosis	Important in endemic regions
Non-infectious	Autoimmune, hypothyroidism, uraemia

PATHOPHYSIOLOGY

URTIs may lead to pericardial effusion through:

1. Direct Viral Invasion

Respiratory viruses can disseminate hematogenously and infect pericardial tissues, causing inflammation and increased vascular permeability.

2. Immune-Mediated Injury

Cytokine release and immune activation following URTI may trigger pericardial inflammation.

3. Myopericarditis

Concurrent myocardial involvement may worsen inflammation and fluid accumulation.

4. Types of Effusion

- Serous (typical of viral infections)
- Serosanguinous
- Purulent (bacterial infections; associated with high morbidity)

CLINICAL FEATURES

1. **Symptoms:** a) Persistent fever following URTI, b) Chest pain (sharp, pleuritic, relieved by sitting forward), c) Dyspnea, d) Fatigue, e) Irritability (infants), f) Palpitations.
2. **Physical Signs:** a) Tachycardia b) Muffled heart sounds, c) Tachypnea d) Hepatomegaly e) Pulsus paradoxus f) Hypotension (suggestive of tamponade).
3. **Beck's triad:** jugular venous distension, muffled heart sounds and hypotension.[2]

Table 2: Clinical Features – Adult vs Child

Adults	Children
Chest pain, fever, dyspnea	Fever, irritability, poor feeding
Pericardial rub	Tachycardia, muffled heart sounds

6. Diagnostic Evaluation: The diagnostic criteria (1) include two of following four clinical criteria. 1. characteristic chest pain: sharp pleuritic pain becomes relived by sitting & forward leaning position 2. pericardial rub 3. ECG – ST elevation with concavity facing upwards or PR depression 4. pericardial effusion- shown by clinical, CXR, Echo documentation.

1. Laboratory Tests: a) Elevated CRP and ESR, b) Leukocytosis in bacterial cases, c) Viral PCR or serology (limited diagnostic value), d) Cardiac enzymes if myocarditis suspected.

2. Imaging

Echocardiography (Gold Standard)[3,4]

- Confirms presence and size of effusion
- Doppler findings: Evaluates hemodynamic compromise, left ventricular outflow tract (LVOT) time velocity integral (VTI) and maximum flow velocity (Vmax) changes more than 20% during spontaneous respiration, restrictive mitral inflow pattern, tricuspid & mitral inflow withreciprocal respiratory changes
- 2D / M mode: Pericardial layers separation can be made when pericardial fluid collection exceeds 15-30 ml, pericardial wall thickness, pericardial fluid volume & type, pleural effusion, dancing / swinging

heart, cardiac chamber collapse (RA, RV & LA) during diastole, and dilated inferior venacava (IVC plethora) without respiratory variation. Detects tamponade physiology.

Severity grade of pericardial fluid:

Grade of pericardial effusion by echo	Measurement of echo free space in cm
Mild	<1cm
Moderate	1-2 cm
Large	>2 cm
Very large	More than 2 cm with cardiac compression

Chest X-ray

- Enlarged cardiac silhouette in moderate/ large effusions

Electrocardiogram: Low voltage QRS, Electrical alternans, Diffuse ST-segment elevation in pericarditis.

Figures showing Echo findings: Left-showing mild pericardial effusion, Right-showing severe pericardial effusion with cardiac chambers collapse, LVOT VTI respiratory variability of more than 20% with impending pericardial tamponade, and IVC plethora.

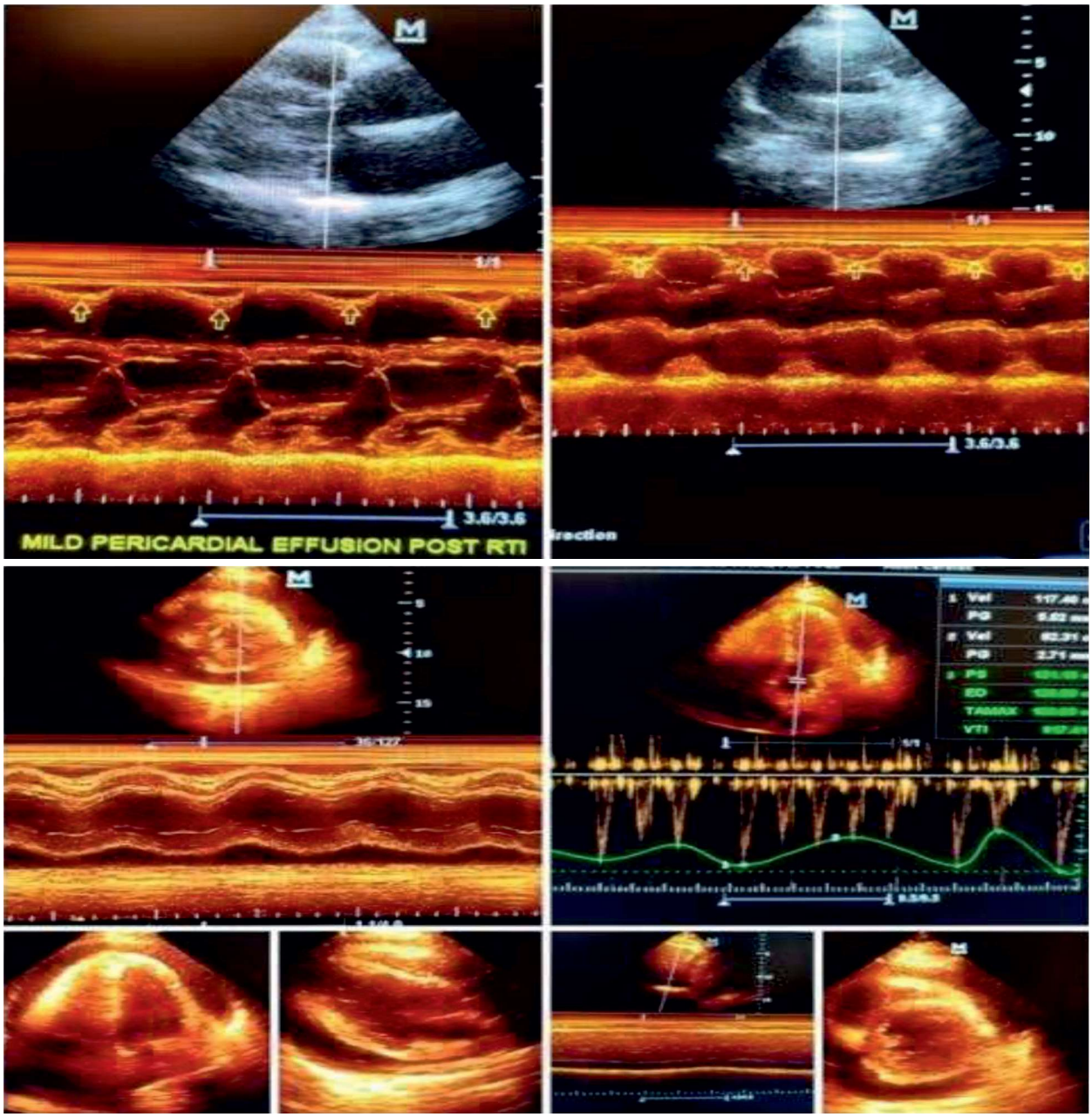

Table 3: showing differences in clinical findings among viral and tuberculous pericardial effusion:

Feature	Viral / post-URTI	TB Pericardial Effusion
Onset	Acute, 1-2 weeks	Subacute/chronic
Chest pain	Prominent	Often absent
Fever	Short-lived	Persistent
CRP	High initially, then falls	ESR disproportionately high
Echo	Clear fluid	Fibrin strands, thickened pericardium
Risk	Recurrence	Risk of constriction

3. Pericardial Fluid Analysis

Indicated when bacterial infection, tuberculosis, or malignancy is suspected.

MANAGEMENT[5,6]

1. Medical Therapy

- NSAIDs for pericarditis-related pain
- Colchicine (in older children) to reduce recurrence
- Antibiotics for bacterial infections
- Antivirals rarely required

Table 4: Drug therapy- adults Vs Children[6]

Drug	Adults	Children
NSAID	Ibuprofen 600-800 mg 6-8 hrly	Ibuprofen 10mg/Kg/dose
Steroids	0.2-0.5mg/Kg/day	Same (second- line)
Colchicine	0.5mg once / twice daily	0.25 mg /day

2. Pericardiocentesis[7]

Indications:

- Cardiac tamponade
- Large symptomatic effusion
- Suspected purulent effusion

Required Materials:

1. Sterile equipment: gown, gloves, cap, mask, gauze, surgical drapes.
2. Antiseptic solution (2% chlorhexidine / betadine / sprit).
3. Local anaesthetic (1% lidocaine)
4. intravenous sedation.
5. Intravenous cannula or angiocatheter (size depends on age).
6. Syringes (20 mL), three-way stopcock, extension tube, central venous catheter, or pigtail catheter.
7. Suture thread, scalpel, sterile dressing, and sterile tubes for sample collection.

Procedure[7]

1. Position patient supine in anti-Trendelenburg (head elevated 30–45°).
2. Disinfect puncture site (subxiphoid region) with antiseptic solution.
3. Use preventive barrier measures (gloves, mask, gown, cap).
4. Administer local anaesthetic subcutaneously.
5. Perform puncture at a 45° angle to the chest, directed toward the left midclavicular line.
6. Insert needle or angiocatheter until fluid or gas is obtained.
7. Collect samples for testing (biochemistry, cytology, microbiology, etc.).
8. For continuous drainage, use the Seldinguer technique to insert a pigtail catheter.

Complications[7]

1. Ventricular arrhythmias.
2. Myocardial or coronary artery puncture (hemopericardium or gas embolism).
3. Pulmonary puncture (hemothorax or pneumothorax).
4. Perforation of abdominal viscera.
5. Cardiac arrest.
6. Pericardial infections or mediastinitis.

Aftercare:

1. Continuous hemodynamic monitoring
2. Catheter care to prevent infections.
3. Chest X-ray and echocardiography to confirm catheter placement and assess cardiac function.
4. Respiratory support if any hemodynamic compromise.

3. Supportive Care

- Monitoring in a pediatric intensive unit
- Oxygen therapy if needed
- Treatment of underlying URTI

8. Prognosis

Most viral pericardial effusions resolve within 2–6 weeks with appropriate

management. Recurrence is uncommon but may occur in immune-mediated cases. Bacterial effusions carry a higher risk of complications and require aggressive treatment.

9. Prevention

- Routine childhood vaccinations (influenza, pneumococcal, Hib)
- Early treatment of respiratory infections
- Close monitoring of high-risk children (immunocompromised, congenital heart disease).

CONCLUSION

Pericardial effusion following URTIs in children is an uncommon but potentially serious condition. Awareness of its clinical presentation, timely diagnostic evaluation, and appropriate management are essential to prevent complications such as cardiac tamponade. Most post-URTI pericardial effusions are benign but needs Echo and CRP guide management. One should always exclude tuberculosis before steroid initiation. Continued research is needed to better understand the immunological mechanisms linking respiratory infections to pericardial involvement.

Conflicts of interest: There are no conflicts of interest for this study.

Consent: Consent taken from parents for scientific publication of echo images.

Sponsors: No sponsors for this study.

REFERENCES

1. Imazio M, Gaita F. Diagnosis, and treatment of pericarditis. Heart 2015; 101:1159-1168.
2. Alerhand S, et al Pericardial tamponade: A comprehensive emergency medicine and echocardiography review. Am J Emerg Med. 2022; 58:159-174.
3. Klein AL, Abbara S, Agler DA. ASE Except Consensus Statement 'Clinical Recommendations for Multimodality Cardiovascular Imaging of Patients with Pericardial Disease, Journal of the ASE Vol 26 No 9 September 2013.
4. Perez-Casares A, Cesar S et al Echocardiographic Evaluation of Pericardial Effusion and Cardiac Tamponade. Frontiers in Pediatrics April 2017 Vol 5 Article 79.
5. Hariri S et al Clinical Evaluation and Management of Pediatric Pericarditis. JETem 2018. 3(4): V22-24.
6. Shakti D, Hehn R et al. Idiopathic pericarditis and pericardial effusion in children: Contemporary epidemiology and management J. Am Heart Assoc.2014; 3: e001483.
7. Maggiolini S, et al. Evolution of the pericardiocentesis technique. J Cardiovas Med (Hagerstown). 2018 Jun; 19(6):267-273.